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BREAD FOR THE MILLION!

A BRIEF EXPOSITION
OF
PERRY & FITZGERALD'S PATENT PROCESS

FOR THE MANUFACTURE OF AERATED

UNFERMENTED BREAD:

WITHOUT THE USE OF ANY DELETERIOUS SUBSTANCE, AND WITHOUT
THE TOUCH OF HUMAN HANDS.

PATENTED MARCH 9, 1858.

"The process is simple, *cleanly and uniform in its results*, involving the use of no substance respecting whose wholesomeness a question can be raised. It SAVES ALL THE CONSTITUENTS OF THE FLOUR, while the process of raising bread by fermentation, *inevitably sacrifices some of them.*"—SAMUEL ST. JOHN, M. D., *Professor of Chemistry, College of Physicians and Surgeons, New York.*

New York:

PUBLISHED BY J. WINCHESTER, 36 JOHN STREET.
1861.

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F. C.

Aug. 1. 1861.



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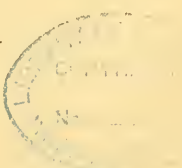
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PERRY AND FITZGERALD'S PATENT PROCESS

FOR THE MANUFACTURE OF AËRATED

UNFERMENTED BREAD.

PATENTED MARCH 9, 1858.

"BREAD IS THE STAFF OF LIFE." No article of human food equals it in importance, since it is an almost indispensable component of every meal, in all civilized countries. Its preparation, in such a manner as to be both palatable and wholesome, has engaged the earnest attention of the scientific and the ingenious, with variable success. While the question of *cheap bread* has been regarded by the political economist as involving, in its solution, the maintenance of social order, its aspect, in a sanitary point of view, is of still graver interest, as upon the *quality* of the great staple of life depends, in no small degree, the PRESERVATION OF HEALTH.

There are now two principal kinds of Bread : that made by the process of *fermentation*, and that made by the re-action of *chemical agents* ; as, for example, by the mixture of *tartaric acid*, ("cream of tartar,") with *supercarbonate of soda*.

Bread, properly so called, is now made exclusively by the one or the other of these methods, and its two varieties are known as "Bakers'" and "Home-made" bread.

The so-called "ship-bread," "hard-bread," &c., belong strictly to the "cracker" family, and are the only examples of *unfermented* bread known to the public. In nutritive qualities, "hard bread" is THE RICHEST, and "bakers' bread" THE POOREST. The latter, on account of its extensive adulteration, is not merely innutritious, but unwholesome and indigestible.

The DESIDERATUM of a thoroughly "light," or porous *unfermented bread*, in the manufacture of which *all the constituents of the flour should be preserved*, without the use of any IMPURE or *deleterious substance*, has long been sought for, but, until the invention of Perry & Fitzgerald, with very little success. Before proceeding to a particular exposition of the NEW PROCESS, let us briefly consider the methods universally adopted in the manufacture of the great Staple of Life.

THE PROCESS BY FERMENTATION.

The *only agent* by which the dough-mass can be made "light," or porous, whether by the fermentative or the chemical process, is CARBONIC ACID GAS. This gas is generated, in the old modes of bread-making, by means of *yeast* or *ferment*, which is a *process of decay*, within the mass, of a *portion of its constituent elements*; or by the chemical agencies before alluded to. In the method of Perry & Fitzgerald, the pure carbonic acid gas is introduced, *under pressure*, to a *mechanically kneaded dough*, by which it is made thoroughly "light" or spongy, and NO CHANGE OR DETERIORATION OF THE NUTRITIOUS PRINCIPLES OF THE GRAIN CAN POSSIBLY RESULT.

A few words as to the nature of "ferment," and the effects of *fermentation* upon the constituents of the flour, which are so little understood by the general public.

Ferment, or *yeast*, is so called from the power which it possesses of causing *fermentation*. It possesses all the characteristics, chemically speaking, of a *compound of nitrogen in the state of putrefaction* (Liebig), and evolves *carbonic acid gas* from its own mass, like other bodies in a state of *decomposition*. When kept under water, it emits carbonic acid gas, accompanied by other gases of an *offensive smell*, and is at last converted into a substance similar to *old cheese*. When its *putrefaction* is completed, it is *no longer capable of inducing fermentation* in other bodies, so that its action is manifestly and simply to *communicate its putrefaction* to the body with which it is brought in contact. To change the terms of the description, *ferment*, or *yeast*, may be characterized as a body in a *rotting condition*, producing its peculiar effects by *propagating its rottenness* to other bodies! This is proven conclusively by the fact that *all bodies* in a *rotting* or *putrefactive state*, such as blood, gluten, cheese, albumen, urine, &c., *have the power of producing fermentation*, and their use would be equally rational and equally harmless with that of *ferment* or *yeast*!

"Artificial *ferment*, or *yeast*," says another authority, "is nothing more than the DECOMPOSING vegetable gluten or albumen, produced by previous fermentation. If yeast be examined by the microscope, it is found to contain a vast number of globular bodies, *possibly animalcules*, which derive their nutriment from it."—*Kane's Chemistry*.

The effects of *ferment* or *yeast* upon the constituents of flour (gluten, albumen, starch, sugar, &c.), are, to produce what is called the *vinous fermentation*, by which the *sugar is converted into alcohol*.

The celebrated Dr. Ure, in his "*Dictionary of Arts, Manufactures and Mines*," Art. BREAD, discusses somewhat at length the various processes of bread-mak-

ing. He says: "Dough, fermented with the aid of either leaven or yeast, contains little or none of the saccharine matter of the flour, but, instead, nearly half its weight of spirit, which is volatilized or expelled by the heat of the oven."

"When a substance," says Liebig, "which contains saccharine matter, albumen and gluten, (as flour), is mixed with ferment or yeast, fermentation ensues, carbonic acid gas escapes from it, and alcohol is produced in quantity exactly corresponding to that of the sugar it originally contained."

The vinous fermentation continues, unless checked, until the whole sugar is decomposed, but no longer, and is immediately succeeded by the acetous (or "sour") fermentation. Now, these changes are simply progressive stages in the development of putrefaction, by which the total mass is necessarily affected.

Prof. Youmans, in his "*Alcohol and the Constitution of Man*," speaking of the vinous fermentation, by which, as has been shown, alcohol is produced, says: "It" (alcohol) "is a product of dissolution—of the wreck and disorganization of the principles of human food. It has the same origin as those malignant and fatal exhalations which constitute the genius of pestilence—the death and putrefaction of organic matter."

The celebrated Dr. Alcott, in his "*Lectures on Life and Health*," says: "Neither leaven nor yeast ought ever to have been known. THEY ARE A FILTHY CONCERN. Besides, fermented bread is a semi-putrid bread: that is, it has advanced one step on the highway to PUTREFACTION. In fermentation, a portion of the saccharine matter—the LIFE or VITALITY of the bread—is used up, and carried off as alcohol and carbonic acid gas."

In a recent number of the *London Medical Times and Gazette*, in an article treating of the new process of bread-making, we find the following appropriate remarks in regard to the products of fermentation and the injurious effects of fermented bread upon the human system:

"The prejudicial matters imparted to bread by fermentation are principally two: *acetic acid*, and the *yeast plant*. The first is produced in large quantities, especially in hot weather, by the oxydation of the alcohol produced. The second is added when the baker forms his sponge, and is also rapidly propagated during the alcoholic fermentation, and cannot be afterwards separated from the other materials. * * It is not difficult to understand how the most painful and distressing symptoms and derangements may follow the use of bread in which the yeast plant is not thoroughly destroyed previous to ingestion, and in those cases of impaired function in which the peculiar antiseptic influence of the stomachal secretions is deficient, and is incapable of preventing the development of the yeast plant in the stomach, and the setting up of alcoholic fermentation TO DERANGE THE WHOLE PROCESS OF DIGESTION AND ASSIMILATION."

PHYSIOLOGICAL EFFECTS OF FERMENT.

M. Claude Bernard, Professor of General Physiology of the Faculty of Sciences, Paris, in a lecture on the "*Chemical Agents of Disease in the Living Body*," after

referring to the action of various poisons, which are supposed to be produced within the living organization by certain physiological conditions, says :

"The introduction of foreign principles, of course, acts upon the blood with still more intensity ; nearly all the substances known under the name of *ferments* are endowed with the property of communicating a deleterious influence to this fluid. When *yeast* is introduced into an animal's veins, passive hemorrhage, and other adynamic symptoms are immediately produced, and *death takes place within a few days*. It seems likely that, in this case, a series of decompositions take place in the blood, which give rise to other ferments."

Yeast or ferment, as is well known, belongs to the "fungus" family, such as mold, toadstool, &c. A work by Rev. M. J Berkeley, published in London during the past year, describes more than a thousand species of *Fungi*. The author states that "domestic affairs are indebted to fungi to some extent, since an important use is made of a particular condition of *certain species of mold*, in the preparation of fermented liquors, *under the name of yeast*. This consists of more or less oval bodies, which continually give off joints, so as to produce short, branched, necklace-like threads. These joints fall off, and rapidly give rise to a new generation, which is successively propagated till THE SUBSTANCE IS PRODUCED WHICH IS KNOWN UNDER THE NAME OF YEAST."

Fungous mold will sometimes appear on the inside of bread a few hours after it has been baked, and as the power of reproduction or germination is found to resist a moist heat equal to that of boiling water, these growths, *the product of fermentation*, are not destroyed in the bread by the heat of the oven, but undoubtedly CONTINUE THEIR VITALITY IN THE HUMAN STOMACH, giving rise to inveterate dyspepsia, and other distressing forms of organic disease. Let the intelligent reader ponder these important chemical truths.

THE PROCESS BY CHEMICAL AGENTS.

A common way of making bread, biscuit, &c., is the "quick process," by the addition of cream of tartar, super-carbonate of soda, &c. Let us for a moment consider the *changes* which take place in the "reactions" of these chemical agents, when so used in the "raising" of bread.

Cream of Tartar, so called, is the bitartrate of potassa ; or, in other words, potassa in combination with an *excess* of tartaric acid. Super or bicarbonate of soda is the carbonate of soda, saturated with, or having an *excess* of, carbonic acid gas.

These salts, being combined in certain definite proportions by the bread-maker, are added to the dry flour, when it is called "prepared" flour ; or, subsequently, at the moment of mixing, as in the ordinary method.

The result of this combination is, that the excess of tartaric acid, liberated by heat and moisture, seizes upon, and unites with, the soda, expels the carbonic acid gas, and forms a new compound salt, known as *tartrate of soda and potassa*, which remains as a *permanent product in the bread*. It is in this way that the necessary carbonic acid gas is furnished which produces the spongy texture of the dough. It is, in a word, the result of a *chemical destruction* of the cream of tartar and the supercarbonate of soda. The *NEW PROCESS* produces the spongy texture in a far superior manner, by means *purely mechanical*, and, of course, *WITHOUT ANY RESIDUAL PRODUCTS OF ANY KIND*.

It is important, in this connection, to consider the sanitary aspect of the question of bread-making—to consider the effects upon the human system, both in health and disease, of the *constant medicinal action* necessarily following the use of bread made by any of the old chemical methods.

It is obvious that any *medicinal action* which is *constant* must be *injurious*. The mere statement carries its own confirmation, and makes argument and illustration unnecessary. But let us look at this a little in detail.

Take, for example, the *tartrate of soda and potassa*, which is a double salt formed in the bread, as before described. This salt, sometimes called tartarized soda, and commonly known as “Rochelle Salt,” is a cooling *purgative*, and is the active ingredient of Seidlitz Powders. In small doses, it renders the urine alkaline, and furnishes a base for the formation of *urinary calculi* (stone in the bladder).

So again, the best housewife, having no definite rule to guide her (and such a rule is impossible), is frequently troubled by the *souring* of the “sponge.” This souring is caused by the supervention of the *second, or acetous* fermentation, to correct which, or to restore the mass to its former “sweetness,” resort is had to *saleratus* or *pearlash* (carbonate of potassa), carbonate of soda, &c.

The result of these additions is, to neutralize the acidity; or, in other words, the acetic acid produced by the second fermentation unites with the potassa and soda of the carbonates, liberates the carbonic acid which again causes the “sponge” to swell and become “light,” and forms new chemical compounds of *acetate of potassa* and *acetate of soda*.

Now, the acetate of potassa, and, in a less degree, the acetate of soda, is a *diuretic* and *purgative*, producing, in sufficient doses, frequent watery stools and copious discharges of urine. Thus, like the residuum of the first-described process, these residual salts also have a *constant medicinal action*. But when the pearlash added is largely in excess of what is needed to correct the acidity of the sponge, it remains *undecomposed in the bread*, and is even more decidedly and actively injurious than when converted into acetate:

"It produces," says Orfila, "a disagreeable, acrid, burning taste ; heat in the throat and stomach ; acute pain in the throat, which soon descends to the bowels ; insupportable fetor of the breath ; frequent risings ; inclination to vomit ; hiccough, constipation, but more frequently copious, and more or less bloody, stools ; colic ; burning thirst ; cold and clammy sweats," &c.

COMMON ADULTERATIONS OF BREAD.

In concluding our remarks on this portion of the subject, it will be sufficient merely to allude to some of the more common adulterations of bread which are practiced by the bakers. These odious frauds are doubly villainous—they rob the consumer of health and life, and cheat him of his measure of sustenance.

Owing to its energetic action upon fermentation, and its quality of *increasing the weight*, by increasing the capacity of the flour to absorb moisture, *sulphate of copper* (blue vitriol) is much employed. It imparts to the bread, when too freely used, a peculiar, disagreeable odor, like that of leaven.

Alum, also, acts in a similar manner. As the bakers say : "*It keeps water and raises well.*" Says Dr. Ure : "It is a very serious thing to have the digestive process daily vitiated by *damaged flour whitened with alum*. Acidity of stomach, indigestion, flatulence, headaches, palpitation, costiveness, and urinary calculi, are some of its consequences." But these adulterations are too numerous to be fully described in this pamphlet. They would swell it to the dimensions of a *Treatise*.

PERRY & FITZGERALD'S PROCESS FOR MAKING LIGHT, NUTRITIOUS AND UNADULTERATED BREAD, WITHOUT FERMENTATION.

The application of pure carbonic acid gas, *under pressure*, to a mechanically kneaded dough-mass, as in the invention of Perry & Fitzgerald, did not occur to Dr. Ure ; though he seems to have had a clear foreshadowing of the importance of the artificial use of the gas, since he states, hypothetically, that "if water, highly impregnated with carbonic acid gas, be used for kneading the dough, *the resulting bread will be somewhat spongy*. Could a light article," he continues, "be produced in this way, then, *as the sugar would remain undecomposed*, THE BREAD WOULD BE SO MUCH THE SWEETER AND MORE NOURISHING."

What, to Dr. Ure, was evidently a clearly comprehended *chemical truth*, has been *practically developed* by the brilliant invention of Perry & Fitzgerald. Posterity will hold their names in grateful remembrance, as among the most eminent benefactors of mankind.

The superiority of *unfermented* bread is by no means new. Dr. Cullen, who wrote more than seventy years ago, says :

"In Scotland, nine-tenths of the lower class of people, and that is the greater part of whole, live upon unfermented bread, and unfermented farinacea in other forms; and *there are not a more healthy people anywhere to be found.* In the course of fifty years, that I have practiced among them, I have had occasion to know this, and have hardly met with a disease, of any consequence, that I could impute to the use of unfermented farinacea."

At a later period, Professor Thompson, of Glasgow, in his work on the "Food of Animals," after alluding to the facts referred to above by Dr. Cullen, and other kindred facts, observes :

"Such, then, being sufficient evidence in favor of the WHOLESOMENESS OF UN-FERMENTED BREAD, it becomes important to discover *in what respects it differs from fermented bread.* The result gained by this process (fermentation) may be considered to be *merely the expansion of the particles of which the loaf is composed,* so as to render the mass more readily divisible by the preparatory organs of digestion. But, as this object is gained at a SACRIFICE OF THE INTEGRITY OF THE FLOUR, it becomes a matter of interest to ascertain the *amount of the loss* sustained in the process."

The result of Professor Thompson's experiments showed a difference in favor of unfermented bread of nearly *seven per cent.* over that made by the ordinary process. In other words, there was a LOSS OF OVER ONE-SIXTEENTH OF THE NUTRITIVE PROPERTIES OF THE FLOUR, which, by the process of fermentation, *was driven into the air and lost.*

ITS SUPERIORITY.

We come now to a more particular consideration of the SUPERIORITY of the Bread made *without fermentation*, or the use of chemical agents, over the Bread made by those processes. Although, from what has already been said, the superiority appears in most vivid contrast, yet the public will be better satisfied to have the points re-stated specifically; for it only needs that the advantages secured by this method be clearly understood in order to its universal introduction in the manufacture of Bread.

I. ITS CLEANLINESS.—Instead of the dough being mixed by the naked hands or feet, the bread, *from the wetting of the flour to the completion of the baking*, is not, and scarcely can be, touched by any one. "One desideratum attained in its manufacture," says Dr. Willard Parker, "*is its entire cleanliness.*" Says Dr. Waterbury: "The process is not only *purely scientific*, but PRE-EMINENTLY CLEANLY."

II. ITS PRESERVATION OF ALL THE NUTRIENT PRINCIPLES OF THE FLOUR.—As the raising of the dough is by the *mechanical introduction of pure carbonic acid gas*,

under pressure in a closed vessel or receiver, it takes a perfect vesicular or spongy texture. ALL THE CONSTITUENTS OF THE FLOUR REMAIN WHOLLY UNCHANGED, while the process of raising bread by fermentation *inevitably sacrifices some of them*, as has been already shown.

III. ITS UNIFORM CHARACTER.—Bread made by the New Process is *uniformly light, sweet and nutritious*. The conditions being simple, and not liable to variation, NO FAILURE CAN OCCUR IN ALWAYS PRODUCING BREAD OF THE SAME QUALITY. It retains its moisture much longer than fermented bread, does not sour, and may be eaten warm with impunity.

IV. ITS WHOLESOMENESS.—Being *free from the deleterious substances which are the product of fermentation*, or chemical reactions, by the old modes, the bread made by the New Process is EASY OF DIGESTION, AND AGREES WITH THE MOST DELICATE STOMACH. "To dyspeptics," says Dr. Cox (late of the N. Y. Medical College), "*it will be invaluable*, as they will be able to use it when the fermented manufactured bread has been found to have signally failed as an article of diet." Says the *London Medical Times and Gazette* :

"Since the introduction of the new *unfermented* bread, there have already been received from members of the medical profession, who have recommended it in their practice, as well as from non-professional sources, accounts of the really astonishing results that have followed its use in cases of deranged digestion and assimilation. Many persons have reported their recovery to health, after years of suffering and misery, by the simple use of the bread as a diet. Many cases have also been reported by medical men of position, in which certain distressing forms of dyspepsia, which had remained intractable under every kind of treatment, have yielded as if by magic, almost immediately after adopting the use of the unfermented bread.

"The beneficial effects of the new bread are attributable to two causes. The one to the *absence of the prejudicial matters* imparted to ordinary bread by the process of *fermentation*; and the other to the *presence* in the bread, unchanged, of those elements which are the *essential agents of digestion and assimilation*."

V. ITS RAPIDITY AND ECONOMY.—By the use of mechanical means, instead of manual labor, a barrel of flour is converted into baked loaves in *forty-five minutes*; whereas, by the ordinary process, four or five hours are occupied in the formation of the "sponge," and a further time in kneading, raising, and baking the dough. The saving of expense by the substitution of machine labor for manual labor of a very exhausting kind, is very large, by which the business of bread-making is rendered *exceedingly remunerative*, while it is removed from a domestic manual work into a manufacturing work.

Nov. 15, 1861.

APPENDIX.

REPORT OF SAMUEL ST. JOHN, M.D., PROFESSOR OF CHEMISTRY, NEW YORK COLLEGE OF PHYSICIANS AND SURGEONS.

COLLEGE OF PHYSICIANS AND SURGEONS, New York, July 26, 1861.

MR. J. WINCHESTER: *Dear Sir:* In accordance with your request, I will state, as succinctly as I may be able, the conclusions to which my observations and experiments on the process of bread-making, invented by Perry & Fitzgerald, have conducted me. The great object aimed at in making bread, is to impart to it a permanent cellular structure; in other words, to make it *light*. There are two modes, in use, of effecting this object.

1. By fermentation, a portion of the ingredients of flour is converted into carbonic acid gas and alcohol; the tenacious dough is distended thereby, and the bread made light.

2. By the decomposition of the carbonates, carbonic acid gas is set free, and when thoroughly mixed with the flour and water, makes the dough porous and light.

Perry & Fitzgerald's process, which belongs to the latter class, accomplishes the object perfectly, and is free from certain objections which may be urged against the others. By this process the requisite proportions of flour, water and salt are introduced into a close vessel, carbonic acid gas pumped in, the whole kneaded together, and it is ready for baking. Its advantages are obvious. It is simple, expeditious and uniform; it involves no sacrifice of the palatable or nutritious ingredients of the flour; it is cleanly; and it introduces no ingredient whose wholesomeness has ever been questioned.

The raising of bread by fermentation is objectionable, for several reasons. Uniform good results by it are difficult, almost impossible to be attained. The quality of the yeast and the flour, the temperature affected by the air, and the heat liberated by the fermentation, ever prone to vary, determine the results. If the fermentation advances too far, the bread is sour; if not far enough, the bread is not light. The flour also suffers the loss of some of its palatable and nutritious ingredients; starch is converted into dextrine (a substance similar to gum-arabic), dextrine into sugar, and sugar into carbonic acid gas and alcohol. Acetic, lactic, and other acids also are generated, which tend to disintegrate and liquefy the gluten, the most nutritious ingredient of the flour. To obviate this, various substances are introduced, as lime, alum, blue vitrol, &c. Moreover, the fermentation of dough is always accompanied by the growth of species of microscopic fungous plants, whose vitality is not always destroyed by baking, and to which many physicians have ascribed the unwholesomeness of new fermented bread. These difficulties have led to several devices for raising bread without the use of ferments. Salcratus (carbonate of potassa) stirred into a mixture of flour and sour milk (lactic acid), undergoes decomposition, the resulting carbonic acid gas rendering the mass porous. Carbonate of soda with sour milk gives a similar result. A "raising powder," which has been extensively used, consists of tartaric acid, or cream of tartar, mixed with bi-carbonate of soda and flour. These processes of evading the use of yeast or leaven are successful in forming light bread, but they introduce a perceptible amount of salts, lactates, and tartrates of potassa and soda, the prolonged use of which may be deleterious. Prof. Horsford proposes to substitute for cream of tartar, the acid phosphate of lime, raising the bread as before, by the free carbonic acid, from the bi-carbonate of soda, and producing the phosphates of lime and soda, which he claims are more wholesome than the tartrates, &c. Perry & Fitzgerald generate the carbonic acid gas in a separate vessel, and thus introduce no ingredient into the dough whose wholesomeness is questionable. Carbonic acid gas is indeed unfit for breathing, but is

constantly taken into the stomach, with grateful results, in soda water (which is water saturated with carbonic acid gas), champagne wine, beer, &c.

After repeated examinations of bread made by this process, I am convinced that it is *the best of which I have any knowledge*. As neither the ingredients nor dough are touched by the hand, and as the gas is washed with pure water, THE BREAD IS CLEAN. The flour suffers no loss or chemical change of its constituents. The bread is light and sweet, and contains nothing but flour, water, and a little salt. It does not sour or mould, and has been eaten with satisfaction by dyspeptics who could not eat fermented bread with impunity.

Respectfully yours,

SAMUEL ST. JOHN, *Prof. of Chemistry.*

TESTIMONIALS.

[We are permitted by JAS. A. REQUA, Esq., to copy the following letters, received by him from several eminent chemists and physicians of this city. The opinions of these gentlemen cannot fail to convince the most skeptical, that the process of Messrs. Perry & Fitzgerald supplies the long-sought-for desideratum in the manufacture of PURE AND UNADULTERATED BREAD.]

The process may be seen in operation on a large scale at the Bakery of DAVIES & Co., corner of Third avenue and Fourteenth street, in this city, where forty to fifty barrels of flour per day are manufactured into bread, at a cost of less than \$1 per barrel; also at the establishment of Messrs. REQUA & PLUMB, Nos. 9 and 11 Hoyt street, Brooklyn, which is capable of manufacturing into bread one hundred and fifty barrels per day. The same gentlemen are putting up machinery at the corner of Lafayette place and Fourth street, in this city, to manufacture *four hundred barrels per day.*]

NEW YORK, June 3, 1861.

DEAR SIR,—Your note of the 31st ult. requested my opinion of the new process for making "Aerated Bread," under Perry & Fitzgerald's Patent. At your invitation, I have carefully examined the whole process of manufacture. I have also used the bread on my table for a week or more. The ingenious mode of introducing carbonic acid gas into the mass of dough, for the purpose of rendering the bread light, is *entirely efficacious*, and thus renders the use of effervescing mixtures, and leaven of all kinds, *wholly unnecessary*. The bread made by this process is of ADMIRABLE QUALITIES, being light, entirely *free from all unpleasant taste and odor*, holds its moisture longer than any other baker's bread that I have seen, and I have no doubt it is perfectly wholesome. I hope it will come into extensive use.

Yours truly,

JOHN TORREY,

Prof. Chemistry, U. S. Assay Office.

59 EAST TWENTY-NINTH STREET, JUNE 10, 1861.

DEAR SIR,—The "Aerated Bread," manufactured under the patent of Perry & Fitzgerald, is, without exception, the best baker's bread I have ever seen. The process employed, as I witnessed it at the bakery, is based upon *true scientific principles*, is perfectly *cleanly*, and yields bread which contains only flour, water, and salt. I have used your bread in my own family

for some time, and have uniformly found it sweet and wholesome. It keeps fresh and moist longer than ordinary fermented bread. I cordially recommend it as well deserving public attention.

Your obedient servant,

WOLCOTT GIBBS,

Prof. Chemistry and Physics in the Free Academy in New York.

NEW YORK, May 17, 1861.

DEAR SIR,—Having carefully examined the process of making what is known as the “Aerated Bread,” under the patent of Perry & Fitzgerald, I have no hesitation in expressing my entire satisfaction with it. The process is *simple, cleanly, and uniform in its results*, involving the use of no substance respecting whose wholesomeness a question can be raised—since the sole ingredients are flour, water, common salt, and carbonic acid gas, the last of which is dissipated in baking. This process *saves all the constituents of the flour*, while the process of raising bread by fermentation *inevitably sacrifices some of them*. The result has uniformly been, so far as I have observed it, a light bread, eminently characterized by that cellular structure which fits it for easy digestion, and with no objectionable qualities that I can discern. Wishing you complete success,

I am, yours truly,

SAM'L ST. JOHN,

Prof. of Chemistry, College of Physicians and Surgeons.

37 EAST TWELFTH STREET, New York, May 20, 1861.

DEAR SIR,—In reply to your note, I beg to state that I have examined several specimens of the “Aerated Bread,” manufactured according to the patent of Perry & Fitzgerald, and have used it in my own family.

I have found it of *superior quality in all respects*. One desideratum attained in its manufacture is *entire cleanliness*.

So far as I have been able to ascertain, it is eminently healthful, inasmuch as it contains none of the products or results of fermentation.

Wishing you all success in the prosecution of your valuable enterprise, I am, yours, &c.

WILLARD PARKER, M.D.,

Prof. Surgery, College of Physicians and Surgeons.

6 WEST FOURTEENTH STREET, New York, June 22, 1861.

MY DEAR SIR—With pleasure I comply with your request asking my opinion of the character of your new “Aerated Bread,” under Perry & Fitzgerald’s patent.

I have used this bread for more than a month, and give it the preference over all other kinds I have eaten.

The use of carbonic acid gas alone, for rendering the bread light, is perfectly successful. The bread is rendered, not only *light*, but *exceedingly pleasant to the taste*, and one of its advantages is that it may be eaten stale, as it is more palatable than when just fresh from the oven, having the quality of retaining its moisture. It is BOTH NUTRITIOUS and WHOLESOME.

Hoping that every success may attend your enterprise, I remain, my dear sir, yours truly,

EDWARD BAYARD, M. D.

58 WEST TWENTY-SIXTH STREET, May 23, 1861.

MY DEAR SIR—In reply to your note of the 16th inst., received yesterday, I beg to say that, from an inspection of your process for making bread, under the Perry & Fitzgerald patent, I think you have accomplished a great *desideratum*, in producing a PURE AND UNADULTERATED ARTICLE, without the manipulation necessary in ordinary bread-making, a result of itself worth a very great deal.

IT DOES NOT SUFFER LOSS FROM THE DESTRUCTION OF ANY OF THE NUTRIENT QUALITIES OF THE FLOUR, AND RETAINS THE PERFECTLY SWEET AND NATURAL TASTE OF THE WHEAT.

Its composition being only flour, water, and salt, with the addition of pure carbonic acid gas, seems to me to constitute it *all that could be desired as pure bread*.

I have used it some weeks in my family, and find that it sustains the expectation formed of it, on the first examination. It retains its moisture much longer (I have tried it when three days old) than ordinary baker's bread, and is like the best "home-made."

To dyspeptics it will be invaluable, as they will be able to use it, when the fermented manufactured bread, charged with alum and other deleterious substances, has been found to have signally failed as an article of diet.

Wishing you every success in your beneficent enterprise, I remain, truly yours,

HENRY G. COX, M. D.,

Late Professor of Theory and Practice of Medicine in the New York Medical College.

2 UNION SQUARE, May 16, 1861.

DEAR SIR:—In reply to your note of this date, requesting my opinions and views of the "Aerated Bread," I take pleasure in saying that the process of manufacture, as witnessed by me through your politeness, is not only PURELY SCIENTIFIC, but PRE-EMINENTLY CLEANLY; and the bread produced, so far as I have found opportunity to test it, is as *delicately porous as the best fermented loaf*. It is also more palatable to many persons, while it appears to be at least equally easy of digestion.

To have gained these signal advantages, WITHOUT THE WASTE AND LOSS INCIDENT TO FERMENTATION, is, I am sure, to have effected a great economy in the staple article of our food. *It is scarcely possible to compute the advantage to the community at large of one such improvement.*

With the best wishes for your success, truly yours,

ROBERT L. WATERBURY, M. D.

HEADQUARTERS, ULSTER GUARD, 20TH REGIMENT, LIGHT INFANTRY, N. Y. S. M.
ANNAPOLIS, Md., May 10th, 1861.

DEAR SIR:—I have not forgotten to acknowledge your very acceptable donation of several packages of your patented "Aerated Bread," generously made to our Regiment as we were leaving your city for the war. The delay, which may seem to you neglect, was only that I might test every virtue which you claim for the article. I can now speak of them what I know. The bread has been on our table every day since we left, and is considered by all a great delicacy. It loses none of its flavor by its age, but, for me, really seems to improve. It is sweet, light, and very palatable. I consider it, in every respect, **THE BEST BREAD I EVER TASTED**, in addition to its

power of retaining its excellence so long, the virtue which gives it its inestimable value. I wish I could be the means of informing a much larger number than I am able of its incalculable merits.

In behalf of the Regiment I thank you very heartily for your donation, and wish you success in introducing it to a very large sale. Very respectfully yours,

WILLIAM LOUNSBERY,

Commissary, 20th Regiment, Ulster Guard, N. Y. S. M.

From the N. Y. Daily Tribune, May 20, 1861.

AERATED BREAD.—On the 9th day of March, 1858, Mr. Elisha Fitzgerald, of No. 45 Greene street, took out a patent for making bread by supplying the carbonic acid gas, which is used in all processes for raising bread, in a pure state under pressure, while mixing. We witnessed Mr. Fitzgerald's process two or three months ago, as conducted with a small model apparatus, consisting of a vessel for making carbonic acid gas, in any of the ordinary methods, a gasometer, a force pump, and a strong hollow copper globe, with stationary arms of the shape of a case-knife blade, projecting from the sides, and a revolving shaft which carries similar arms between these stationary arms. Ninety-six ounces of flour, 57 ounces of water, and $1\frac{1}{2}$ ounce of salt were poured into this copper globe, and the opening was closed by a strong brass screw cap. The gasometer was then filled with gas, the force-pump worked so as to fill the copper globe with gas, and a faucet turned to let the air out of the globe. This was then closed, and the operation of mixing performed by turning a crank attached to the shaft within the globe. At the same time the force-pump was worked, forcing in the carbonic acid gas under a pressure of about 100 pounds to the inch. In a few minutes the dough was kneaded, and was let out at the bottom of the globe by turning a faucet. It was then baked in a common stove oven, and the result was $142\frac{1}{2}$ ounces of very light, sweet bread, in which the taste of the wheat was delightfully preserved. The bread is of a granular texture, and was pronounced by people who knew nothing about the mode of making it, to be the best they ever ate.

From the New York Daily Times, July 29, 1861.

BREAD FOR THE ARMY.—We have begun to realize the fearful results of going into battle with empty stomachs; but since this has been the occasional mistake of every campaign during the last six thousand years or so, we have not the courage to hope for a reform at this late day. But there is one reform, of almost equal practical importance, which modern science enables us to institute—the rapid and economical preparation of wholesome and uniform food in large quantities. This is a matter of primary importance—it ranks in advance of rifled cannon and gun-boats.

Cases will undoubtedly occur during this war, in which some provision for dispensing a few wholesome and nutritious mouthfuls to soldiers, during a day's action, will carry our colors further into the enemy's country than they could be driven by the most improved projectiles; a blood and tissue-making charge, put into the stomach of a brave man, at the right time, is worth a dozen ball-cartridges in the chamber of a hungry man's musket.

THE GRAND IMPROVEMENT OF THE TIME, however, in this department—one to which we most earnestly invite the attention of the proper officers—is *the process of making the most wholesome bread*

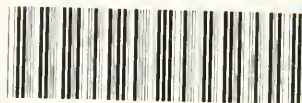
and that which can be longest preserved fresh, in the shortest time, and at a CONSIDERABLE REDUCTION OF COST over present plans, when it is produced in large quantities. We refer to the process of forcing pure carbonic acid gas into an unadulterated mixture of flour, water and salt, thus making the bread very light and porous WITHOUT THE USE OF YEAST OR ANY OTHER DECAYING SUBSTANCE, to generate this gas in the bread, and WITHOUT THE DESTRUCTION OF ANY OF THE NUTRITIOUS PRINCIPLES OF THE FLOUR.

To make light and easily digestible bread, the particles of flour must be forced apart, by some means, till the whole structure presents the cellular appearance of a fine sponge ; otherwise the digesting acids of the stomach cannot get surface enough to act on. Since the flour itself, or a still more conveniently applied ingredient, yeast, affords the means of procuring this result in the bread itself, no other means has generally been deemed necessary. The sugar in the flour is converted, by the slow but natural process of fermentation, into carbonic acid and alcohol. The gas, being generated uniformly throughout the mass of dough, distends it into a honeycomb of little cells or bubbles, whose number depends on the resisting pressure of the gluten in the flour, to the escape of the gas. The alcohol and gas are dissipated during the operation of baking. Of course, this process *not only destroys some of the nutritious portions of the flour*, but it *leaves in the bread some remnants of the decaying yeast* or the other chemicals which made the gas, and THE BREAD IS TO THAT EXTENT IMPURE AND UNHEALTHY. The new process is to make the carbonic acid gas in a separate place, and to force it mechanically into intimate and immediate mixture with all parts of the flour and water ; in which case pure gas, in uniform quantity, performs its important work in pure flour, water, and salt, without leaving any of its gas-making materials in the bread, or extracting any of them from it. The whole operation of making two barrels of flour into bread occupies about an hour ; while 150 barrels can be made into dough, by a single machine, per day.

The process is *cleanly*, as no hand (or foot) touches it until the bread is baked ; it retains all the nutritious principles of the flour ; it retains its moisture and sweetness longer than fermented bread ; it must be nearly uniform in quality, as nothing but the flour can form a variable element ; the time of preparation is greatly reduced, as no time is required for "raising" it ; and the cost, when large quantities are required, is considerably lessened.

The medical testimony is unanimous in favor of this bread, and since its cost and the facility of its preparation are equally favorable, we hope the machinery for making it will be at once set up in all our more permanent encampments and fortresses.





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THE HYPOPHOSPHITES

shows that these preparations have a *tenfold* and *specific action*. On the one hand, they increase the Principle, whatever that may be, which CONSTITUTES THE NERVOUS FORCE; and on the other, they are most powerful blood-generating agents, far superior to any hitherto known. * * * In all females in whom the disease is not too far advanced, the catamenia becomes more abundant and highly colored. Their effect upon the tubercular condition is IMMEDIATE—all the general symptoms disappearing with a rapidity which is really marvellous. There is an increase of nervous power, sometimes even from the first day of their administration, together with an unusual feeling of comfort and strength. The nervous symptoms, if there have been any, disappear, as well as the functional derangements. The appetite increases, often in an extraordinary manner. The evacuations become regular and more abundant; the perspirations, if they have existed, cease; SLEEP BECOMES CALM AND PROFOUND.

VOICES OF MEDICAL AUTHORITIES. THE OLD TREATMENT.

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"I have used Winchester's Hypophosphites in Phthisis, Anemia and Chlorosis, with marked success, curing a case of consumption where Tubercles, no doubt, existed in the second stage of development. I cured a case of Chlorosis at once, and several cases of Anemia, where great debility existed."—*Dr. Merrell Reese, M.D., LL.D., American Medical Gazette.*

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